CONSTRAINTS TO CASSAVA VALUE CHAIN DEVELOPMENT IN NASARAWA STATE, NIGERIA

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Abstract

The study evaluated constraints to cassava value chain development in Nasarawa state, Nigeria. Data were collected from 1,360 cassava farmers, processors and marketers using questionnaire and analyzed descriptively for mean scores. Poor road network resulting to high cost of transportations for cassava roots (3.1) was a severe problem. Other constraints included inadequate capital (3.0), labour intensity and drudgery (2.9), poor market price (2.9) and low demand for cassava roots (2.8), and perishability of cassava roots (2.6). Low sunshine and temperature for sun-drying in wet-season was a severe constraint (3.0). Other environmental constraints were harvesting difficulties in dry season period (2.9) and water shortage (2.7). Smaller cassava roots consume more labor during peeling (2.9), and irregular cassava root shapes resulting in loss during peeling (2.5) were severe constraints to cassava processing. Inadequate capital (2.9) and inadequate market for cassava processed products (2.8 were recorded). During wet season, sunshine and intensity are shortened and relatively low (3.0) due to cloud cover. Also, the atmospheric humidity is high, making sun-drying difficult. Poor market price for cassava value added products (3.2) was recorded to be a severe constraint to their marketing effort. Other constraints to marketing of cassava products are poor road network resulting to high cost of transport (3.0), market competition with imported substitutes (2.9), lack of standardization (2.6) and low demand for cassava products (2.5). Farmers should allow their cassava to fully mature before it is harvested, and processing of the cassava be done in the dry season for proper sun drying and good quality.

Keywords: constraints, value chain, marketing, value addition, development

Introduction

Cassava is a staple food in Nigeria. A staple as defined by Lawal *et al.,* (2013) is one that is eaten regularly and which provides a large proportion of the population's energy and/or nutrients. According to Nyerhovwo (2004), 80% of Nigerians reside in the rural areas and they eat cassava meal at least once a day and when compared with rice and maize, it has a carbohydrate content of about 40% higher than rice and 25% more than maize. Also, it is the cheapest source of calories for both human and animal consumption. Hence, cassava plays a major role in the country's food security. Furthermore, cassava generates income for its producers, processors, transporters and marketers and serves as raw material in industries such as bakery, textile, paper, plywood and confectionaries (Babatunde, 2011; FAO, 2012).

Major constraints to development of cassava post-harvest systems are (a) the perishability of the fresh roots and (b) the presence of cyanogenic compounds in cassava (Meridian Institute, 2013). Cassava is susceptible to physiological deterioration after the roots are harvested. Roots greater than 48 hours old

have little market value and limits the range over which fresh roots can be marketed (Kingsbury, 2010). Inadequately processed cassava creates a potential health hazard (presence of cyanogenic compounds) (Nhassico *et al*., 2008). Cassava has short shelf-life; it is bulky in terms of weight and volume (Out *et al.,* 1992). This affects the cost of transportation and storage, therefore, it has to undergo physical transformation in order to make it fit for consumption and to prolong its shelf live, marketability, and stability of the crop (building reserved stock to even market supply).

Losses due to poor handling, lack of processing and adequate storage, in the root/tuber crops was estimated to be between 20 and 40% of the harvested product annually (Gwera, 2009) in Nigeria. This magnitude of loss is not only a waste of food (Olayemi, *et al.,* 2012) but also waste of human effort, farm inputs, livelihoods, investment and scarce resources; giving rise to perpetual poverty, continuous inability of farmers to procure farm inputs from the proceeds of the remaining unprocessed produce, painting a picture of producing food below demand. This scenario has widen the poverty gap especially among farmers, reduced employment along the supposed value chain activities and pausing security risk (Mrema and Rolle, 2002). While this study was conducted, emphasis is on the challenges to production, processing and marketing of cassava and cassava products.

Methodology

The study was conducted in Nasarawa State, located between North Latitudes 7^{o} and 9^{o} and 7^{o} and 10^{o} East Longitudes (Nuhu and Amed, 2013) covering land area of about 27, 137.8sq Km representing 2.98% of the Nigeria land mass (www.tradingeconomics.com, 2014). It has an estimated population of 1,863,275 people (National Population Commission, 2006). Nassarawa State is characterized by a tropical sub-humid climate with two distinct seasons: the wet and dry with annual rainfall ranging from 1100 mm to about 2000mm (NADP, 2013) and temperature of 74^{o}F and 95^{o}F(https://weatherspark.c, 2020)

Stratified random sampling method was used in the three agricultural zones (Nasarawa north, made up of Akwanga, Nasarawa Eggon and Wamba LGAs; Nasarawa west, encompassing Karu, Keffi, Kokona, Nasarawa and Toto LGAs; and Nasarawa south housing Awe, Doma, Keana, Lafia and Obi LGAs of the State) to draw up 1,360 sample from the universal population comprising of cassava producers, processors and product marketers. Data were collected via questionnaire fashioned in a likert scale model and analysed descriptively for mean score.

Results and Discussion

Constraints to cassava production

Table 1 shows that poor road network resulting to high cost of transportations for produced cassava roots (mean of 3.1) was a severe problem. Other constraints that were severe to the cassava farmers also included inadequate capital (3.0), labour intensity and drudgery (2.9), poor market price for cassava roots (2.9), low demand for cassava roots (2.8), high perishability of cassava roots (2.6), and inadequate planting material (cassava stem for cutting) (2.5).

Production of cassava is done in rural areas which are mostly characterized by poor and bad road networks especially during wet season. This makes transportation of cassava produce difficult. Small scale farmers depend on personal savings as source of capital to finance their production activities as a result expansion of farm enterprise become difficult due to inadequate capital. They often lack the collateral to access credit facilities in financial institutions in order to boost their activities.

The cultural practices in cassava production are labour intensive and this discourages farmers. Because of the drudgery associated with farming activities, some farmers cultivate but small land area. Apart from inadequate capital for production purposes,

drudgery is a reason why vast arable land is lying virgin. Poor market price for cassava roots is a discouraging factor to the farmers. At harvest prices are not attractive occasion by low demand for the cassava roots, offering no incentive to the farmers to be enthusiastic to continue in the production of the cassava. When cassava is harvested deterioration sets in within 75 hours because of its characteristic high water content (perishabilty). Lack of readily available market runs cassava producers into looses.

Poor road network resulting in high cost of transportation (3.1) was recorded as a serious problem (Table 1). Lawal *et al.,* (2013) had explained that poor road network may put farmers at the disadvantage positions by increasing cost of transportation and reducing the profit made by them. According to FAO (2012) when cost of production in agricultural enterprise is high, the profit made by the farmers is lowered, and in marketing the marketing margin is small. Inadequate capital encourages small scale production. Expansion in agricultural enterprise requires increased use of inputs such as labour (use of mechanical labor), seed, chemicals, technologies among others. This could be why peasant farmers continue to use crude implements, low technology application with resultant low yield.

Ekwee and Edem (2014) reported that capital is an important factor in production. It enhances productivity and promotes standard of living by breaking vicious cycle of poverty of small scale farmers. Agricultural credit is essential for acquiring inputs such as land, seeds, and chemicals, financing production activities such as planting, harvesting, storage and marketing of agricultural produce.

Labor intensity and drudgery was a severe problem (2.9) because of inability to acquire labor saving technologies such as tractor and animal tractor. Because of inadequate capital small scale farmers are unable to mechanize their production processes, and to expand. However, scarcity and high cost of labor was not a problem in the area probably because family labour is obvious among small scale farmers. This agrees with the report of Muhammad *et al* (2013), who said labor scarcity is not a constraint among peasant cassava farmers because they utilize family labor in most cases.

Inadequate land for production of cassava and drought are not severe (2.4) to the cassava farmers in the area. This perhaps is because most of them are small land owners; therefore, the competition on land is less. Technological progress according to Brodrick (2014) results from new and improved ways of accomplishing traditional tasks. Neutral technological progress occurs when higher output levels are achieved with the same quantity and planting/fertilizer application methods can expand output without increasing land area.

Low demand (2.8) and poor market prices for cassava root (2.9) were severe constraints in the area. Low demand and prices for agricultural products is harmful to the farmers' production because cyclic following increases and decreases in demand and prices. Brodrick (2013) explained that generally, poor farmers do not have enough investment capital to sustain production in unpredictable market situation. This can result in suboptimal investment decisions and compromises production in the long term. Higher food prices have not necessarily translated into better prices for farmers in developing countries because non-food essentials such as cooking fuel, transport, rent, and agricultural inputs have also become more expensive. Also, intermediaries are facing higher transportation costs which they in turn passed on to farmers (Dutt and Wain, 2003).

High perishability of cassava root was a serious constrains (2.6). This may result from high water content (75%) of cassava root, inadequate processing and storage facilities. According to Out *et al,* (1992)

Cassava has short shelf-life; it is bulky in terms of weight and volume. Therefore farmers became price takers because of inability to manage the cassava roots after harvest. Cassava is susceptible to physiological deterioration after the roots are harvested. Roots that last for more than 48 hours after harvest have little market value and limits the range over which fresh roots can be marketed (Kingsbury, 2010). The weight of fresh cassava affects the cost of transportation, storage handling convenience

In adequate planting material (cassava cuttings) was a serious constraint. In the time past, planting materials were usually sourced from previous harvest and neighbours' farms (limiting expansion), but in the face of increased production more needed to be bought. The attendant market opportunity for cassava products have place a need for increased supply of fresh cassava roots for processing. Therefore, land under cultivation for cassava roots is on the increase and requires the use of more planting materials by the farmers.

Constraints to cassava processing (value addition)

Table 2 indicates that environmentally, low sunshine and temperature for sun-drying in wet-season was a severe constraint with mean of 3.0. Other severe environmental constraints to processing of cassava roots included; harvesting difficulties in dry season period (2.9) and water shortage during the dry season (2.7). Seasonal yield differential due to variation in dry matter content of cassava root in wet and dry season was not a constraint to the farmers (2.3). Cloud cover due to rain formation in the atmosphere during rainy season reduces sunshine. This prolongs drying period and gives opportunity for bacterial and fungal attack thereby reducing the quality of the products especially HQCF, chips and *garri.* During dry season soil looses water due to evaporation and becomes hard which cause harvesting difficulties for cassava. At this season, water supply is low. And processing of cassava requires the use of water for washing.

Based on varietal and agronomic factors, smaller cassava roots consume more labor during peeling (2.9), age of cassava at harvest affects the root yield (2.9), starch and quality of products, high perishability of cassava roots (2.5), and irregular cassava root shapes resulting to loss during peeling (2.5) were severe constraints to cassava processing. However, differences in maturity and harvesting time, causing fluctuation in supply of cassava roots and differences in dry matter and starch content of cassava root affecting quality of processed products were not severe constraints to cassava processing. They have mean value of less than 2.5.

Socio economic factors that were severe constraints to processing cassava roots were difficulty in harvesting during dry season which affects labor availability and cost (2.9), inadequate capital (2.9), inadequate market for cassava processed products (2.8) and inadequate processing machines, spare parts, plus high cost of fuel which increases cost of processing (2.9). Transport difficulties due to poor road resulting to high cost of processing were not recorded as severe constraints to processing cassava roots. This is because most of the processing units of cassava are found in the towns and the processors waits for the farmers to bring their produce to the rural market to buy. Sometimes the farmers supply the cassava to the processors at the processing points. Therefore, the processors may not incur cost of transporting the cassava.

During wet season the hours of sunshine and intensity are shortened and low (3.0), respectively, due to cloud cover (Table 2). Also, the atmospheric (air) humidity is high, all these, making sun-drying difficult. Chimauka*, et al* (2013), explained that during the raining season, the sunshine and temperature are low for processing and drying especially in the humid areas. The implication is that long drying periods result

in attacks of bacteria and mould making the cassava product characteristically poor. This according to Fiiro (2016) reduces the market quality of the products.

Harvesting cassava during the dry season is difficult due to the hard soil (2.9). During the dry season when the dry matter is highest (WAAPP, 2013), the soil is too hard for harvesting resulting in lot of breakages/damages and high cost of labour. Water shortage especially during the dry season makes (2.7) processing of cassava roots difficult. In the Savannah zone according to Chimauka *et al.,* (2013), acute shortage of water hinders cassava processing which requires a lot of water. The result on seasonal yield difference due to dry matter content of cassava in wet and dry seasons (2.3) is deviant with the report of WAAPP (2013); that dry matter content of cassava root is usually significantly lower in the early rainy season than in the dry season therefore, resulting in seasonal yield differences in the products processed.

Difficulty in harvesting cassava roots during dry season affects labor availability (2.9). FAO (2016) had reported similar position and said; most of the steps in processing are carried out manually using simple and inexpensive tools and equipment that are available to small farmers. Cassava processing is labor intensive and productivity is usually low. The drudgery associated with traditional processing is enormous and the products from traditional processing methods are often contaminated with undesirable extraneous matter some of the products are therefore, not hygienic and so are of poor market value.

Smaller and irregular shapes of cassava roots consume more labour during peeling (Table 2). The structure of the root, the irregular shape and size (Asiedu, 1989) of cassava root does not permit easy mechanical peeling. Traditionally, peeling cassava tubers presents a considerable problem in cassava processing (Asiedu, 1989). The root shapes and sizes (varietal influence) result in differences in harvesting and peeling times (WAAPP, 2013). Irregular shapes results in losses using manual or mechanical peeler.

The age of cassava at harvest determine its starch content, root yield and quality of the product(s). Because of the need for cash, farmers harvest cassava that is not fully mature. The starch and root yield from such cassava root according to Asiedu, (1989) are low. Similar results have been obtained by Brodrick (2013) who reported that depending on variety, age of maturity, the edible flesh of cassava makes up 80-90% of the root. High perishability of cassava root was a severe constraint to the processors (2.6). This result had been reported by Brodrick (2013) that high perishability of cassava root was recorded among processors due to inadequate storage technology and facilities.

Inadequate capital characterizes the small scale processing of cassava roots (2.9). This result is in tandem with the findings of Yuguda *et al.* (2013) who explained that inadequate funds for production, processing, storage, marketing as well as improvement in the cassava value chain is a major constraint faced by cassava farmers and processors in Taraba State. Inadequate market for cassava products was adjudged as constraint to cassava processing (Table 2). Yuguda *et al.,* (2013) also reported that low demand and unattractive prices for cassava value added products are constraints to the farmers/processors.

A transportation difficulty due to poor road leading to high cost of processing was not a serious constraint (2.4). This is because the Subsistence farmers harvest cassava when in need. Thus they leave the cassava in the ground for long periods, believing that the cassava is safer and would undergo less damage than when harvested. Although this system has certain merits, a delay in harvest can result in root losses due to root rots during raining season, damage by animals, and a decrease in the starch content in roots.

Constraints to cassava products marketing

Poor market price for cassava value added products (3.2) was recorded to be a severe constraint to their marketing in this study. Other constraints that were severe in marketing of cassava products are poor road network resulting to high cost of transport (3.0), market competition with imported substitutes (2.9), lack of standardization of cassava products in the markets (2.6), and low demand for cassava products (2.5) (Table 3).

Cassava products such as HQCF, *garri* and flakes have substitutes like imported flour, corn flour and beans cake, respectively. Depending on consumers taste, the cassava products may suffer low patronage to their substitute in the market. However, inadequate capital was not a serious constraint to the traders in marketing cassava value added products. This may be possible because the marketers analyses the market demand and tries to merge with supply. And where the demand rise(s) the marketers collects the products from their suppliers on credit and settles after making sales. The cassava products imamates from processes that is manual at the local households and organized processing units. There is no adherence to standard measures, the quality of the products are substandard hence low market value.

The result of this study confirmed the report of Yuguda *et al.,* (2013) who opined that low demand and unattractive price for cassava added products are constraints to both the cassava farmers, processors and marketers. Poor road network have been identified to increase transportation cost for agricultural products, thereby shutting marketing cost and reducing the profit margin made by the traders (FAO, 2016). Competition in the market affects local products especially those of low quality. Yuguda *et al.,* (2013) found that products from traditional processing methods are often contaminated with undesirable extraneous matter therefore not hygienic and so have poor market value.

Conclusion and Recommendations

Conclusively, inadequate capital, drudgery, high water content of cassava, making it perishable and poor market price for cassava products were the major constraints to cassava production. Low sunshine for sun-drying in wet season, difficulty in harvesting cassava roots in dry season due to hard soil, irregular cassava root shapes were found to be some of the difficulties of processing cassava roots. Poor market price for cassava value added products, high cost of transportation due to poor road network, market competition especially HQCF with substitute good (wheat flour), lack of standardization of cassava products, and their subsequent low demand are some of the characteristic market difficulties in trading cassava value added products. It was recommended that:

i. Cassava farmers are advised to allow their cassava to fully mature before harvesting. This will increase the dry matter content and reducing the water level
ii. Players in the cassava value chain development should maintain quality standard. This can be achieved by adhering to the standards for cassava roots, chips, HQCF, *garri* and starch developed and released by the standard organization of Nigeria (SON) as outputs towards the attainment of the Presidential initiative on cassava since 2006.
iii. Land policies in Nigeria should be reviewed to allow farmers own and enlarge their production enterprises and intending farmers to acquire land for production.
iv. Price control policies should be activated and enforced in Nigeria to protect both the suppliers of goods and the consumers.
v. Local Government and State Authorities should build water facilities like dams, wells and boreholes especially in rural

communities to curb problem of water shortage especially during dry season as well as road network to facilitate transportation of cassava roots to markets and processing points.

Table 1: Constraints to Cassava Production

Cassava Production Constraints	**Percentage of Level of Severity**					
	Very severe	Severe	Less severe	Not at all	Percentage total	Mean
Inadequate land for production of cassava	8.4	41.9	32.4	17.2	100.00	2.4
Inadequate planting material	25.9	25.9	31.4	24.1	100.00	2.5
Scarcity and high cost of labour	10.3	18.1	44.0	27.6	100.00	2.1
Poor road network resulting in high cost of transport	30.0	55.5	9.5	5.0	100.00	3.1
Low demand for cassava root	25.5	33.8	30.5	10.2	100.00	2.8
Poor market price for cassava root	20.0	55.0	17.1	7.9	100.00	2.9
Inadequate capital	36.0	40.0	11.0	12.9	100.00	3.0
Problem of drought	1.7	3.4	63.8	31.9	100.00	1.8
High perishability of cassava root	20.0	34.0	31.0	15.0	100.00	2.6
labor intensity and drudgery	36.2	32.6	20.3	15.0	100.00	2.9

Bench mark: 2.50. Decision: Any constraint with mean ≥ 2.50 is a true constraint to cassava production.

Table 2: Constraints to Cassava Processing (value addition)

Constraints to Cassava Value Addition	**Percentage of Level of Severity**					
	Very severe	Severe	Less severe	Not at all	Percentage total	Mean
i. Environmental factors						
a.Low sunshine and temperature for sun drying in wet season	50.0	25.6	2.5	21.9	100.00	3.0
b.Harvesting difficulties in dry season due to hard soil	28.1	41.7	22.2	8.1	100.00	2.9
c.Seasonal yield differences due to variation in dry matter content of cassava in wet and dry season	13.9	16.1	39.7	30.3	100.00	2.3
d.Water shortage especially in dry season period	30.0	38.9	5.5	25.6	100.00	2.7
ii. Varietal and agronomic factors						
a.High perishability of cassava root	20.0	35.0	31.1	13.9	100.00	2.6
b.Differences in maturity and harvesting time, causes fluctuation in supply of cassava roots	14.7	20.3	26.1	38.9	100.00	2.1
c.Irregular cassava root shapes results in loses during peeling	13.9	25.0	55.8	5.3	100.00	2.5
d.Smaller roots consume more labor during peeling	50.6	13.9	13.3	22.2	100.00	2.9
e.Differences in dry matter and starch content of cassava root affectsquality of processed products	13.9	25.0	27.8	33.3	100.00	2.2
f.Age of cassava at harvest affects the root yield, starch and quality of products	40.3	26.1	19.4	14.2	100.00	2.9
iii. Socio-economic factors						
a. Difficulty in harvesting during dry season affects labour availability and cost	29.4	36.1	26.9	7.5	100.00	2.9
b.Transport difficulties due to poor road resulting to high cost of processing	12.8	53.9	21.4	11.9	100.00	2.4
c.Lack of processing machines, spare parts, plus high fuel cost; increasing processing cost	27.8	25.0	26.9	20.3	100.00	2.6
d.Inadequate market for cassava processed products	26.4	30.6	41.7	1.4	100.00	2.8
e. Inadequate capital	22.2	50.0	19.4	8.3	100.00	2.9

Bench mark: 2.50. Decision: Any constraint with mean ≥ 2.50 is a true constraint to cassava processing.

Table 3: Constraints to Marketing Cassava Value-added Products

Constraints to Trading Cassava Value Added Products	**Percentage of Level of Severity**					
	Very severe	Severe	Less severe	Not at all	Percentage total	Mean
Market competition with imported substitutes	19.5	55.0	18.6	6.9	100.00	2.9
Lack of standardization of cassava products in the market	31.0	23.6	15.2	30.2	100.00	2.6
Poor road network resulting in high cost of transport	39.5	37.6	6.0	16.9	100.00	3.0
Low demand for cassava root	12.6	31.9	45.0	10.5	100.00	2.5
Poor market price for cassava root	35.0	50.0	10.0	5.0	100.00	3.2
Inadequate capital	18.6	23.8	36.4	21.2	100.00	2.4

Bench mark: 2.50. Decision: Any constraint with mean ≥ 2.50 is a true constraint to trading cassava products.

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